ever, that by using the above combination, the bismuth and lime-water help to allay the irritability of the stomach, and when they are given in conjunction with iodine, I think that the effects of the latter are more lasting, while the nausea is certainly controlled more quickly. Should intestinal disturbance also exist, the bismuth of course is still further advantageous. This prescription needs to be prepared anew every day, as the free iodine combines with the lime to form the iodide of calcium, on standing twelve hours.

Or, what will be found more convenient, have the above formula put up but omit the iodine, which is to be kept in a separate bottle, and the requisite amount dropped in the desertspoonful immediately before administration.

ARTICLE IX.

GASTROSTOMY, ŒSOPHAGOSTOMY, AND INTERNAL ŒSOPHAGOTOMY IN THE TREATMENT OF STRICTURE OF THE ŒSOPHAGUS.

By MORELL MACKENZIE, M.D. Lond., Senior Physician to the (London) Throat Hospital, and Lecturer on Diseases of the Throat at the London Hospital Medical College.

OWING to circumstances which it is unnecessary to analyze here, operations on the internal organs of the body have become much more common than they were formerly, and in recent years the stomach has been very frequently operated on with the view of counteracting the effects of œsophageal obstruction. It will probably appear to many that the time has now come when the various methods may conveniently be described, and their relative merits and drawbacks compared. The three operations which we have to consider are gastrostomy, œsophagostomy, and internal œsophagotomy.

Gastrostomy has been the most frequently practised, and will probably be proved to be the most valuable of all the operations for the relief of œsophageal stricture.

History of the Operation.—Gastrotomy, for the extraction of foreign bodies, has been practised since the sixteenth century, but gastrostomy, or the establishment of a "mouth" in the stomach, for the purpose of feeding a patient who is unable to swallow, was first proposed and fully described by Egeberg,[1] a Norwegian surgeon, in 1837. It was, however, actually carried out for the first time in France by Sédillot,[2] in 1849. After him it was performed by Fenger, Cooper, Forster, Sydney Jones, Curling, Bryant, Van Thaden, myself, Troup, Durham, Fox, Maury, Low, MacCormac, Jouon, Smith, Clark, Mason, Jackson, Rose, Möller,

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[1] Memoir read before the Med. Soc. of Christiania, May 8, 1837.

[2] Gazette Médicale de Strasbourg, 1849, p. 366.

Jacobi, Hjort, Küster, Tay, Heath, Verneuil, Callender, Schönborn, Lanelongue, Courvoisier, Trendelenburg, Le Dentu, Riesel, Messenger Bradley, Studsgaard, Langenbuch, and Langton. The details of all the operations performed by these surgeons may be found in an elaborate treatise published by H. Petit[1] in 1879. Since the appearance of that work cases have been reported by McCarthy,[2] Littlewood,[3] Pye-Smith,[4] McGill,[5] Morris,[6] Buchanan,[7] Escher,[8] Milner Moore,[9] Lücke,[10] Gritti,[11] Kroenlein,[12] Bryant,[13] Langton,[14] Golding-Bird,[15] Reeves,[16] Kappeler,[17] Anders,[18] Fowler,[19] Bugantz,[20] Elias,[21] Maydl,[22] and Hume.[23] Several cases have been operated on by Howse and Davies-Colley, but the details have not been published.

The following is the best mode of operative procedure: The patient having been placed on his back, and an anæsthetic having been administered, the surgeon should first try to map out by careful percussion the situation of the stomach. The area of stomach-resonance varies somewhat in different individuals, and also in the same person according to the condition of the viscus itself. In those who have been suffering for some time from partial starvation, the organ is apt to be retracted so as to be altogether covered by the inferior margin of the thorax. To obviate any difficulty from this source the stomach has sometimes been successfully inflated with air before the operation, or ether has been pumped into the viscus from the mouth, or gas has been generated within the organ itself by the administration, first of hydrochloric or tartaric acid, and shortly afterwards of bicarbonate of soda.[24] When the stricture is not impermeable, any of these plans may be of service, but none of them are necessary.

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[1] Traité de la Gastrostomie, Paris, 1879.

[2] Ibid., 1879, vol. ii. p. 466.

[3] Lancet, 1879, vol. i. p. 475.

[4] Trans. Inter. Cong., 1881, p. 456 et seq.

[5] Ibid., 1881, vol. ii. p. 942.

[6] Ibid., 1881, vol. ii. p. 873.

[7] Ibid., 1881, vol. i. p. 7.

[8] Centralblatt f. Chirurgie, Leipzig, 1880, vii. p. 625.

[9] Lancet, 1879, vol. ii. p. 425.

[10] Med. Times and Gaz., 1880, vol. ii. p. 187.

[11] Gazzetta Med. Ital. Lombardia, 1881, serie viii. t. iii. p. 3.

[12] Centralblatt f. Chirurgie, 1881, p. 16.

[13] Lancet, 1881, vol. i. p. 572.

[14] Brit. Med. Journ., July 15, 1882.

[15] Clin. Soc. Trans., vol. xv. 1882, p. 33 et seq.

[16] Ibid., p. 26.

[17] Deutsche Zeitschrift f. Chirurgie, Bd. xvii. Heft 1 and 2, 1882.

[18] St. Petersburg Med. Wochenschr., 1882, xvii. p. 185 et seq.

[19] Ann. Anat. and Surg., Brooklyn, New York, 1882, vi. p. 27 et seq.

[20] Quoted by Maydl, Wien. Med. Blätter, 1882, No. 22, p. 682.

[21] Deutsche Med. Wochenschr., Berlin, 1880, vi. p. 329–333.

[22] Wien. Med. Blätter, 1882, Nos. 15, 16, 17, 18, 19, 21, 22, 23, and 24. Twelve cases are here reported by Maydl, but the actual operator in six of them was Albert.

[23] Lancet, Dec. 23, 1882, p. 1074.

[24] Schönborn (Archiv. von Langenbeck, vol. xxii. p. 500) fitted an India-rubber ball to the end of a fine hollow sound, which he passed down the gullet. When the ball was in the stomach, it was inflated by blowing down the tube. Felizet (Lancet, Oct. 7, 1882), in a case in which he had lately to open the stomach for the removal of a foreign body, passed a small India-rubber tube through one of the patient's nostrils into the

Gastrostomy should always be done with the strictest antiseptic precautions. There are three stages in the operation: 1, to open the abdominal parietes; 2, to transfix the stomach and secure it to the edges of the wound in the abdomen, and to the integument; and, 3, to open the stomach. Between the second and third stages it is most important that some days should elapse.

1st Stage. An incision should be made through the skin for a distance of two or three inches parallel to the left costal margins and about one finger's-breadth to their inner side; the centre of the incision being made to fall about three-quarters of an inch internal to the outer edge of the rectus. The lips of the skin wound should then be held asunder, and the fibres of the rectus should be divided in a vertical direction for about an inch, all hemorrhage being at once checked by torsion of the vessels, or ligature with fine carbolized catgut. When the parietal peritoneum is reached, it should be gently picked up with forceps, and a minute opening should be made in it with the knife. Through this aperture a grooved director should be introduced, on which the membrane is to be slit up in the axis of the incision through the rectus. The peritoneal sac being thus laid open, the stomach will in most cases be at once visible, but sometimes instead of it the omentum, or even the colon comes into view. The former is not likely to mislead the operator, but as it has actually happened that the colon has been opened instead of the stomach, it is well to be on guard against such an accident. The longitudinal bands, together with the *appendices epiploicæ*, and the thinness of the walls will serve to identify the colon, which should be gently pushed downwards out of the way. Should the omentum present itself in the wound, gentle traction should be made until the stomach is brought down so as to bulge out somewhat like a hernia.[1]

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stomach. The proximal extremity of the tube was connected, by means of a piece of tubing, with a recipient containing ether. When the patient was fully under chloroform, the ether-holder was plunged into a vessel of water, at a temperature of 60° Centigrade, when the stomach at once became distended by the vapour. It is obvious that neither this nor Schönborn's plan could be pursued if the gullet was much narrowed. Jacobi (New York Med. Journ., 1874, vol. xx. p. 142) passed a fine catheter into the stomach, and injected a solution of bicarbonate of soda, and shortly afterwards a solution of tartaric acid. Fowler (Annals of Anat. and Surgery, Brooklyn, 1882, vol. vi. p. 27) injected thirty drops of dilute hydrochloric acid, mixed with an ounce of water, followed, after an interval of from two to three minutes, by an ounce of a saturated solution of bicarbonate of soda.

[1] Some surgeons prefer to make a vertical incision along the outer margin of the left *linea semilunaris*, commencing immediately below the edge of the thorax, and continued downwards for three or four inches. The incision through the rectus, as recommended above, was first practised by Mr. Howse, to whom the greater success of gastrostomy in recent years is largely due. The straight fibres of the rectus form a sphincter round the gastric wound, and the dribbling of the contents of the stomach so prone to occur during coughing is thereby prevented.

2d Stage. To keep the stomach in a proper position and prevent its falling back into the abdominal cavity during the remaining steps of the operation, the base of the projecting portion should be transfixed in a direction parallel to the surface of the belly by two long needles, the extremities of which should reach considerably beyond the edges of the wound on either side.[1] The stomach is thus held fast between two transverse supports resting on the surface of the body. The viscus should now be stitched to the abdominal wall either by a single or a double series of sutures. Verneuil uses one set of stitches, the sutures, which are of silver wire, being passed first through the skin close to the edge of the wound, next through the parietal peritoneum, lastly through the peritoneal and muscular coats of the stomach, and out again; the ends are then threaded through a perforated plate, and afterwards through shot drilled with a hole for the purpose, when they are fixed by crushing the leaden ball over them with pincers. Howse, on the other hand, prefers a double circle of stitches; the outer, which consists of carbolized silk sutures, passes through the serous and muscular tunics of the stomach, and afterwards through the skin about three-quarters of an inch beyond the lip of the wound, and is here tied over pieces of quill; the inner circle is made with ordinary sutures of fine wire or carbolized silk, and unites the serous coat of the viscus to the skin close to the edge of the incision. The object of the two circles of stitches is to provide a greater area for adhesion, the whole of the zone between the two circles being likely to unite with the abdominal parietes.

3d Stage. It is most important to delay this till adhesions have been produced between the corresponding peritoneal surfaces round the wound, and the stomach thereby securely fixed to the abdominal wall. Mr. Howse's method is to defer the third step of the operation till the fifth or sixth day, and by some surgeons[2] an interval of a week or even a fortnight is allowed to elapse between the preliminary part and the completion of gastrostomy. The stomach may be opened by puncturing the centre of the exposed portion with a fine-pointed bistoury. As considerable hemorrhage has followed this apparently simple proceeding on more than one occasion, the surgeon should be prepared for such a contingency, the occurrence of which is probably favoured by the congested condition of the islet of stomach-wall included within the ring of sutures. Pressure will probably suffice to stop the bleeding, or the risk may be altogether avoided by opening the stomach with a thermo-cautery point, after the manner of Albert. An India-rubber tube, provided with a plug, may be left in the wound, and kept *in situ* by means of a silver suture, passing through it and the skin on each side, or, as is Mr. Howse's practice, the fistulous opening, which is at first made only large enough to take a No. 6 catheter, may be gradually dilated to the size of a No. 32 instrument (French scale). In either case the wound should be dressed with a pad of lint steeped in carbolized oil (1 in 60), and an additional pad of boracic lint, the whole being kept in place by means of a body-bandage. The sutures should not be removed for about ten days.

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[1] This plan was first recommended by Verneuil (Bull. de l'Acad. de Méd., 1876, p. 1025).

[2] Maydl, loc. cit. No. 15, gives two cases where the interval was fourteen days.

In the interval between the second and third stages of gastrostomy the patient's strength should, if possible, be maintained by rectal alimentation. If the patient, however, has suffered from aphagia for more than two or three days, it may be necessary to do the entire operation in one act.

A few words must be added regarding the manner of feeding the patient after the completion of the operation, as the success of gastrostomy greatly depends on this. Nourishment should be given in small quantities and at very frequent intervals, and during the first few hours it should be given cold or even iced, in order to check vomiting. The act of feeding should, in as far as possible, be an imitation of the natural mode of taking food, that is to say, nourishment should be given in small spoonfuls, about half a minute being allowed to intervene between the helpings. The cause of failure after gastrostomy has undoubtedly sometimes been the unphysiological mode in which the food has been administered. At first the diet should be confined to milk, beef-tea, and a little stimulant; later on, when the stomach has become more accustomed to the novel conditions under which it has to work, light puddings of tapioca or arrowroot, hot milk sweetened with sugar, eggs boiled very soft, beef-tea, and chicken-broth may be allowed. Pounded meat or panada may be given when the patient's power of digestion is established. Trendelenburg[1] advises that the patient should, if possible, masticate the food, and should then blow it through an elastic tube passing from his mouth to the permanent tube in the gastric fistula. The patient has thus the enjoyment of eating, and the digestive process has the advantage of the salivary function.

Many operators have noticed that after gastrostomy the œsophageal stricture yields a little; this is probably due to relaxation of the muscular spasm, and subsidence of the inflammation which almost invariably affects the mucous membrane near the seat of the disease. Hence a day or two after the establishment of the gastric fistula, a little liquid food can often be swallowed. In this way the feeding through the stomach may be minimized at first, and that organ gradually habituated to the abnormal method of receiving nutriment.

The operation has been done sixty-seven times for cancer of the gullet, twelve times for cicatricial stricture, and twice for syphilitic stenosis. In a series of seventy-six cases of gastrostomy of which I have been able to obtain sufficient details, the total number of deaths occurring within a fortnight was fifty-five, *i. e.*, 72.4 per cent.

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[1] Archiv. von Langenbeck, 1878, vol. xxii. p. 227.

In the case of malignant disease the average duration of life after the stomach was opened was rather more than twenty days, the longest period of survival having been six months, and the shortest twelve hours. On looking more closely into the matter, however, it is plain that the results of this operation are progressively growing more favourable. Thus, in thirty-five cases collected by Petit, and extending over a period of thirty years, the average survival of the patient after gastrostomy for œsophageal cancer was slightly more than fourteen days and a half, whilst in thirty-two cases in which the operation has been done for the relief of the same disease within the last three years, the average subsequent duration of life has been more than thirty days. This estimate does not include Howse's cases, which have been alluded to by several surgeons as amongst the most successful operations of the kind that have been performed. It should be added that in fifty-seven cases of which a sufficiently detailed account is given, the average duration of the symptoms at the time of the operation, was about six months and a half, the longest being three years, and the shortest six weeks.

In twelve cases in which gastrostomy has been done for cicatricial stricture, the average of after-life has been more than five months and a half, not including a case of Bryant's, where the result is simply indicated as "cure," without further details. In these cases the average duration of symptoms at the time of the operation had been rather more than five months, the longest period having been one year, and the shortest four weeks.

Lastly, in two cases in which this operation was done for syphilitic stenosis, the average survival was slightly over three days, whilst the average duration of the symptoms had been seven months and a half.

In a total number of eighty-one gastrostomies death from shock occurred within forty-eight hours in twenty-seven, *i. e.*, in 24.6 per cent.

The *advantages* of gastrostomy are :—

1st. That it can be carried out with comparative *ease*.

2dly. That there is very little *risk* in the steps of the operation itself, especially if done in two acts separated by a proper interval of time.

3dly. That there is almost entire certainty[1] of being able to effect the object aimed at, which is the establishment of an alimentary fistula altogether beyond the seat of stricture.

4thly. That the fistula is hidden from sight.

The only *disadvantage*, on the other hand, is that gastrostomy, with every aid of antiseptic precautions in the actual performance of it, and the improved after-treatment which is now adopted, still yields a high percentage of deaths.

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[1] See, however, two cases reported by Maydl (loc. cit.) where the operator was foiled by finding in one a large growth in the stomach itself, and in the other a cancerous condition of the fundus and anterior wall of that organ in addition to the œsophageal disease.

ŒSOPHAGOSTOMY is an operation about which much less is generally known. In dealing with the history of it, therefore, it will be desirable to give a short commentary on all the cases hitherto treated by this method.

History of the Operation.—The establishment of a fistulous opening in the neck for the relief of stricture of the œsophagus appears to have been first suggested by Stoffel.[1] The first recorded instance, however, in which the operation was performed is one briefly alluded to by Tarenget[2] in 1786. The operator's name has not been preserved, but the case was more successful than any of those which have been done since. The patient was a woman suffering from what would seem to have been cancer of the gullet, and in spite of the fact that the cervical and submaxillary glands were already enlarged at the time of the operation, she survived for a period of sixteen months, during which she was fed through the fistula. More than half a century later, Watson[3] published a case of what he calls tubercular stricture, in which he opened the gullet. The disease, however, was probably malignant, as there were no signs of tubercle in the lungs. The patient—a young man, aged twenty-four—lived two months after the operation, and died of œdema of the glottis, for which tracheotomy had to be done. The thyroid body was greatly enlarged, but does not appear to have pressed upon the gullet. Soon afterwards Lavacherie[4] operated on a man, aged sixty-eight, suffering from what was probably a cancerous stricture of the œsophagus. This case is of somewhat doubtful character, as the cutting operation appears to have been undertaken mainly, if not solely, for the extraction of an ivory tube which had been passed into the stricture and could not be withdrawn. The gullet was opened, and the patient was fed through a tube, but it is not clear whether this was introduced through the wound or through the mouth. The patient died on the fifteenth day. Œsophagestomy was successfully performed by Monod[5] on a woman suffering from cancerous stricture of the upper part of the food-channel. She survived the operation three months, and died from the inevitable progress of the disease. In 1853 Follin[6] published a monograph on stricture of the gullet, wherein he advocated œsophagostomy in suitable cases. Richet[7] states that he performed the operation for impermeable narrowing of the gullet opposite the second dorsal vertebra; the canal was opened, and a sound passed through the stricture and left *in situ*. Unfortunately, no further details are given, either as to the result of the case or the nature of the disease. In 1859, Bruns[1] reported the case of a man, aged thirty-eight, suffering from dysphagia, on whom he operated. The patient lived ten days, and, after death, the cause of the complaint was found to be compression of the œsophagus by an enlarged thyroid. A somewhat similar case was related by the same surgeon[2] in 1865. The patient was a man, aged thirty-seven, who had been afflicted with difficulty of swallowing for a year; œsophagostomy was done, and the man died five weeks later. In this case, as in Watson's above related, death was due to pulmonary disease and to œdema of the larynx, which made tracheotomy necessary. The thyroid was found to be somewhat enlarged, and a vast abscess with gangrenous walls was seen encircling the upper part of the gullet. Three years later, Willet[3] performed the operation on a woman, aged forty-seven, suffering from œsophageal carcinoma; the patient had begun to regain her strength when she refused to be fed, and died of exhaustion eighteen days after the establishment of the fistula. In 1868, Cheever,[4] in an interesting report of two cases of external œsophagotomy for foreign bodies, took occasion to make some remarks on the same proceeding when practised for stricture of the gullet, and two years later the whole subject was fully discussed by Terrier[5] in an elaborate and valuable monograph. In 1870 the operation was performed by Menzel[6] on a patient of Billroth's, a man, aged forty-four, suffering from cancerous stricture; death took place on the following day. Three years subsequently, Podrazki[7] performed œsophagostomy on a man, aged forty, who had suffered from well-marked syphilis; the patient died two days afterwards, and his disease, which, during life, had been supposed to be of venereal origin, was found to be purely carcinomatous. In 1875, Poinsot[8] operated on a woman, aged fifty-five, whose œsophagus was obstructed by malignant growths; the patient expired twenty hours after the operation. In 1876,[9] I recorded a case in which œsophagostomy had been performed by Evans, nine years previously, on a woman, aged forty-three. The disease was malignant, and the patient died of collapse fifty hours after the operation. In the same year a case was related by Horsey,[10] in which he operated on a boy, aged five, who had swallowed some caustic fluid; the gullet was unintentionally opened above the stricture, which was found to be quite impervious. The wound was therefore closed, and the little patient died of shock within twenty-two hours. In 1877, Kappeler[1] related two cases of œsophageal cancer, in which he made an opening into the gullet through the neck. In each instance the operation had been undertaken with a view to actual removal of the disease by excision, and it was only when this was found impracticable, owing to its extent and situation, that, as a desperate measure, œsophagostomy was tried. The first patient, a man, aged forty-two, died five days after the operation; whilst the other, a man of sixty-five, survived only forty-four hours. In the same year, Bryk[2] published a case in which he had performed œsophagostomy in a case of cicatricial stricture; the patient was alive seven weeks after the operation, but the ultimate result is not stated. Nicoladoni[3] also recorded a case in which he had recourse to œsophagostomy. The patient was a girl, aged four, who was suffering from cicatricial stricture of two years' standing; the gullet was incised above the point of narrowing, when it was found that the tube was dilated at its upper part. The little patient died in six days. An instance is related by Zenker,[4] where the operation was done on a boy, aged three years and a half, for cicatricial stricture. Death occurred within twenty-four hours. Simon is referred to by Kœnig[5] as having opened the œsophagus in a case of cancer, but no detail is given beyond the fact that the patient survived only thirty-four hours. Hadlich[6] operated in 1880 on a man, aged sixty, who was unable to swallow from some cause, the nature of which was not clearly established. The patient died thirteen months after the operation, but an autopsy was not permitted. In the same year Studsgaard[7] performed œsophagostomy on a woman, fifty-two years of age, suffering from cancerous stricture; she improved considerably after the operation, and died five months later from the natural progress of the disease. The same surgeon[8] operated quite recently on a girl, aged nine, who had swallowed nitric acid. Death took place eight days afterwards, owing to "hemorrhage from the internal jugular vein caused by septic ulceration." In 1880, œsophagostomy was also performed by Holmer,[9] of Copenhagen, on a man, aged fifty-seven, for cancer of the right tonsil and pharynx; the patient lived two months. In 1881, Annandale[10] related three cases in which he had performed the operation for cancerous stricture. In the first, the patient, a woman aged forty-two, survived three months, and finally died of septicæmia; in another, the patient, also a woman aged fifty-three, died in ten days. Unfortunately, no details are given of the third case, which is the more to be regretted, as it was one of exceptional interest, a second stricture having been encountered when the gullet had been opened below the first, and gastrostomy having, therefore, been found necessary. The operation has lately been practised by Timothy Holmes.[1] The patient was a man, about fifty years of age, who suffered from malignant stricture of the œsophagus; he died about three days after the operation. Reeves[2] has also recently performed œsophagostomy on a man, aged sixty-three, who died on the eighth day. To these cases should be added one in which Butlin[3] states that he witnessed an attempt at œsophagostomy which had to be abandoned owing to the wide extent of the disease, and another reported by Maydl,[4] in which it was found impossible to open the gullet in a case of cicatricial contraction, owing to the extreme hardness of the walls.[5]

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[1] Bonet, Sepulchretum, Lugduni, 1700, lib. iii., sec. iv., obs. xx. p. 35.

[2] Journ. de Méd.-Chir. et Phar., 1786, t. lxviii. p. 250.

[3] Dublin Journ. of the Med. Sciences, 1845, vol. xxvii. p. 260.

[4] Bull. de l'Acad. de Méd. Royale de Belgique, 1845, t. iv. p. 758.

[5] Quoted by Follin, Rétrécissements de l'Œsophage, Paris, 1853, p. 116.

[6] Ibid., p. 125.

[7] Traité Prat. d'Anat. Méd.-Chir., 2e éd., 1860, p. 508.

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[1] Deutsche Klinik, 1859.
[2] Ibid., 1865, p. 37.
[3] St. Barth. Hosp. Rep., 1868, vol. iv. p. 204.
[4] Two Cases of Œsophagotomy, Boston, 1868, p. 61.
[5] De l'Œsophagotomie Externe, Thèse de Paris, 1870.
[6] Wien. Med. Wochenschr., 1870, No. 56, p. 1350 *et seq.*
[7] Ibid., 1873, Nos. 33, 35, 36.
[8] Reported by Bidau, De l'Œsophagotomie, Bordeaux, 1881, p. 19.
[9] Med. Times and Gaz., 1876, vol. ii. p. 137.
[10] Amer. Journ. of the Med. Sciences, new series, vol. lxxii., 1876, p. 114.

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[1] Deutsche Zeitschr. f. Chir., 1877, vol. vii. p. 381 *et seq.*

[2] Wien. Med. Wochenschr., 1877, Nos. 41 and 45.

[3] Ibid., No. 25.

[4] Ziemssen's Cyclopædia, vol. viii. p. 28.

[5] Krankheiten des Pharynx und Œsophagus, Stuttgart, 1880, p. 122.

[6] Deutsche Zeitschr. f. Chir.

[7] Hospitals Tidende, 2 R. vii. No. 43, Copenhagen, Oct. 27, 1880.

[8] Private letter from Dr. Studsgaard to the Author, dated Dec. 21, 1882.

[9] Hospitals Tidende, Copenhagen, 1882, No. 1.

[10] Liverpool Med.-Chir. Journ., No. 1, July, 1881, p. 14 *et seq.*

The mode of performing œsophagostomy is as follows: The patient should be placed on his back with his shoulders somewhat raised, and his head turned toward the right side. An anæsthetic having been given, the surgeon, standing behind the patient's head, should make an incision through the skin on the left side from just above the sterno-clavicular articulation to about the level of the hyoid bone. The platysma should then be cut through, and if a vein of any size, such as the external or anterior jugular, is met with, it should be divided between two ligatures and turned aside. The superficial fascia should next be slit up on a grooved director along the line of the original incision, and the anterior edge of the sterno-mastoid laid bare. The patient's head should then be slightly raised, so as to relax the tissues of the neck, and an assistant should draw aside the sterno-mastoid with a retractor. The omohyoid (which can be recognized by its direction inwards and upwards) is now brought into view, and should be divided as near to its hyoid insertion as possible. The carotid sheath is next to be held aside together with the sterno-mastoid, whilst the trachea is drawn inwards by a second assistant. The connective tissue being torn through with the handle of the knife, the left lobe of the thyroid body should be raised and pushed towards the middle line, when the trachea will be fully exposed, together with the œsophagus behind it. It may sometimes be difficult to identify the latter tube, and it may be necessary, therefore, to pursue the dissection down to the pre-vertebral muscles. A sound[1] should now, if possible, be passed from the mouth through or into the stricture. By this means the operator will be guided to the situation of the gullet, which should be opened by a vertical incision 2½ to 5 centimetres long, through its lateral wall. In cases of cancerous stricture the opening should be made as far below the seat of disease as possible, whilst in cicatricial stenosis the knife may be carried through the contracted tissues. When the tube has been opened, a silk ligature should be passed through each edge of the œsophageal wound, and again through the corresponding lip of the cutaneous incision, and the gullet should be gently drawn towards the surface and loosely attached to the outer wound. A curved tube measuring about three inches in length below, and one above the bend, with a suitable shield at its upper extremity, should be introduced into the œsophagus through the wound, and fixed in position by means of tapes round the neck. Sutures may be used to bring the edges of the skin-wound together above and below the feeding-tube, should this appear desirable.

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[1] Med. Times and Gaz., July 29, 1882, p. 117.

[2] Private letter from Mr. Reeves to the Author, dated July 20, 1882.

[3] Sarcoma and Carcinoma, London, 1882, p. 184.

[4] Wien. Med. Blätter, 1882, No. 17, p. 523.

[5] Professor Gross, in the most recent (1882) edition of his Surgery, refers (vol. ii. p. 495) to cases in which this operation has been practised by Packard and Cohen. As I am unable to find any published details of either of these cases, they are not included in the above summary.

The food should, of course, be liquid, and in order to prevent it from soaking into the tissues of the neck, when the patient is to be fed, it is better to pass a second long inner tube some way down the gullet, through the shorter tube which is constantly worn. The nutritive fluid may either be injected with a syringe, or poured in through a glass funnel.

Œsophagostomy should never be performed unless there be good reason to believe that it will be possible to introduce a tube into the gullet below the seat of stricture.

On analyzing the recorded cases of œsophagostomy, it will be found that out of a total number of twenty-six cases, in which the operation was performed, sixteen, *i. e.* 61.5 per cent., died within a fortnight, whilst deaths from shock occurred in seven or 26.9 per cent. Œsophagostomy has been done seventeen times for the relief of cancerous stricture, four times for cicatricial contraction, three times for dysphagia caused by compression of the gullet from without, and twice for stenosis of somewhat doubtful character.[2] The longest duration of life after the operation in any of these cases was sixteen months; the shortest, eighteen hours.

In the malignant cases the average duration of life after the operation was rather more than fifty-two days. If, however, Tarenget's case, in which the patient lived sixteen months, be omitted from consideration as too vaguely reported and of too ancient date to be quite trustworthy, the average term of survival in the remaining fifteen instances was twenty-four days. In seven cases of œsophagostomy for cancer in which sufficiently full details are given for an estimate to be made, the average duration of the symptoms before the operation was six months, the longest being eleven months, and the shortest three months.

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[1] A special instrument was devised for this purpose by Vacca Berlinghieri (Della Esofagotomia, Pisa, 1820), consisting of a curved hollow sound widely fenestrated at one side to allow of the protrusion of a stylet which pushes the wall of the gullet outwards. An ordinary flexible bougie tipped with a metallic knob will, however, be found to answer just as well.

[2] Richet's case is too lacking in detail to be taken into account.

In the four cases in which œsophagostomy was done for cicatricial contraction, the average duration of life after the operation was nearly seven weeks. In three of the four, however, the patients were children, and in them the average was little more than two days and a half. This high mortality of the operation in the case of children utterly negatives the views of those who maintain that œsophagostomy does not cause much shock, and it points to the desirability of postponing the operation where practicable to a more advanced period of life.

In the three instances of dysphagia from compression, the average period of survival was five months, whilst in the two cases of doubtful nature it was nearly two months.

Death from the immediate shock of the operation took place in four of the cases of malignant obstruction and in two of the cases of cicatricial contraction. The statistics of this operation do not show the steadily progressive improvement which is seen in the case of gastrostomy.

The great *advantages* that are claimed[1] for œsophagostomy are :—

1st. That it is attended with comparatively little systemic shock.

2dly. That it facilitates subsequent dilatation of the stricture; in other words, it is so far curative that it may enable the patient's existence to be indefinitely prolonged.

The supposed absence of shock, however, is not borne out by the actual facts, seeing in five cases[2] death occurred within twenty-four hours after the operation, whilst in a sixth[3] the attempt to open the gullet had to be given up, owing to the collapsed condition of the patient. As regards the second alleged advantage, it does not appear that there is any case on record in which an œsophageal stricture has been successfully dilated through an opening in the neck.

The *disadvantages* of the operation are :—

1st. That owing to the depth from the surface at which the gullet is situated, and the fact that when diseased it is often fixed to the surrounding parts, the operation is a very difficult one. (To this should be added, in cases of cicatricial stenosis, that the walls of the organ may be so tough as to make it difficult, or even impossible, to cut through them.)

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[1] Whilst Follin (Rétrécissements de l'Œsophage, pp. 125–6, Paris, 1853), Terrier (De l'Œsophagotomie Externe, p. 62 *et seq.*, Paris, 1870), Annandale (Liverpool Med.-Chir. Journ., No. 1, July, 1881, p. 13), Bidau (De l'Œsophagotomie, p. 38 *et seq.*, Bordeaux, 1881), and T. Holmes (Med. Times and Gaz., July 29, 1882, p. 118) give a moderate support to the operation, Mr. Reeves (Trans. Clin. Soc., vol. xv., 1882, p. 29 *et seq.*) has come forward as an uncompromising champion of it.

[2] Menzel, Poinsot, Kappeler, Horsey, Zenker.

[3] Maydl, loc. cit.

2dly. That great *danger* inevitably attends a cutting operation carried out in immediate proximity to such important structures as the large bloodvessels and nerves of the neck, and the thyroid gland, which is not unfrequently enlarged in cases of œsophageal stenosis.

3dly. That there is great *uncertainty* in any given case whether the opening in the œsophagus can be made below the stricture. (Even when its upper limit can be made out with tolerable accuracy, the extent of the disease cannot even be guessed at, and if in an exceptionally favourable case the lower margin could be approximately ascertained, a second stricture may exist lower down.)

4thly. That a discharging fistula in the neck is a conspicuous disfigurement.

Comparing gastrostomy and œsophagostomy together, it may be affirmed —1st, that gastrostomy is both *easier* and *safer* to perform, the risk of hemorrhage and other surgical complications being much less; and, 2dly, that gastrostomy *always* meets the difficulty to be overcome—that is to say, the obstruction to the passage of food into the stomach—except in those comparatively rare cases in which the stomach itself is also diseased. The effect of either procedure in relieving the patient's immediate sufferings, notably from thirst, and occasionally, in a less degree, from hunger, is often very marked, and it might be expected that the disease would make less rapid progress when the gullet is no longer exposed to irritation by persistent endeavours to swallow. It cannot, however, be denied that the benefit of these operations has often been shown more in the euthanasia which they have brought about, than in any appreciable prolongation of the patient's life. In fact, judging from statistics alone, operative interference would seem to be attended with less satisfactory results than the milder palliative measures generally adopted. Thus, whilst the average duration of life in a series of 100 of my cases of malignant stricture of the gullet—in which no operation was attempted—was *eight* months, the average extent of life after the first manifestation of distinct symptoms till death in fifty-three cases in which gastrostomy was performed was *seven* months.[1] The records of œsophagostomy for cancer seem at first sight more favourable than either of the above estimates, for in eight cases, of which sufficient details are given to form the basis of such a calculation, the average period from the first appearance of dysphagia till death was *ten* months. This result is, however, largely due to Podrazki's case being included; and it may be pointed out that the long duration of antecedent dysphagia in this instance furnishes no very certain measure of the length of time during which the *cancer* had existed, the patient having suffered severely from syphilis, and the difficulty of swallowing having at first yielded to anti-venereal remedies. Moreover, as the patient survived the operation only two days, it is obvious that the weight which the case apparently throws into the scale in favour of œsophagostomy is quite illusory. Podrazki's case may therefore be disregarded as being merely a disturbing element in the present calculation. The remaining seven cases of œsophagostomy for malignant disease show an average duration of life of only *seven* months after the first appearance of symptoms.

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[1] It is right to state, however, that the recent records of this operation taken alone show much better results. Thus, in twenty cases reported since 1879, the average duration of life from the first onset of the disease was seven and a half months, notwithstanding that in one case the period of survival is only reckoned as four months, and in another as ten days, though the patients in each instance were still alive, and likely to live for some time, at the date of report. If the Albert-Maydl cases alone are considered, a still more favourable result will be found. The total average in seven cases was eleven and a half months, notwithstanding that one of the patients still living at the date of report is only counted as surviving the operation six weeks.

INTERNAL ŒSOPHAGOTOMY is an operation which, though it has *à priori* much to recommend it, is unfortunately very seldom applicable owing to the extent and character of œsophageal strictures.

History of the Operation.—To Maisonneuve[1] belongs the credit of first attempting to relieve cicatricial stricture of the gullet by internal incision. He operated on three cases, of which two died and one recovered. In the two fatal cases the patients were women, and succumbed to peritonitis. In a fourth case in which Maissonneuve attempted internal œsophagotomy the patient's death was due to a false passage which was made into the posterior mediastinum. Lannelongue[2] soon afterwards operated successfully. Dolbeau[3] performed the operation on two patients, both of whom appeared to be cured as long as they continued under observation. Trélat[4] had a good result from the procedure in spite of severe primary and secondary hemorrhage. Tillaux,[5] Studsgaard,[6] and Schilz[7] have each reported a successful case. The last-named surgeon was less fortunate in a second instance, in which the patient died from profuse hemorrhage.[8] Czerny[9] performed the operation on a child who died from periœsophageal cellulitis complicated by diphtheria. Recently cases have been treated after this method by myself and by Dr. Roe,[10] of Rochester, U. S., the particulars of which will be found below. Dr. Elsberg,[11] of New York, has also operated successfully in two cases.

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[1] Clinique Chirurgicale, Paris, 1864, t. ii. p. 409.

[2] Mém. de la Soc. de Chir. de Paris, 1865, t. vi. p. 547.

[3] Gazette des Hôpitaux, 1870.

[4] Bull. Gén. de Thérap., 1870, t. lxxviii. p. 252.

[5] Bull. de Thérap., 1872, t. lxxxiv. p. 14.

[6] Canstatt's Jahresb., 1873, Bd. ii. p. 487; and 1875, Bd. ii. Abtheil ii. p. 297.

[7] Correspondenz-Blatt. d. Aertz. Verein. in Rheinland, April, 1877, No. 19, p. 19.

[8] Ibid.

[9] Beiträge zur Operat. Chirurg., 1878, p. 70.

[10] New York Med. Record, Nov. 11, 1882.

[11] Arch. of Laryngol., Jan. 1883.

The stricture has sometimes been divided from above downwards,[1] but this method is extremely dangerous, and should never be attempted. The incisions should always be made from below upwards. Special instruments have been devised for the purpose by Dolbeau,[2] Trélat,[3] and myself. My œsophagotome consists of a gum-elastic bougie, about fifteen inches long, terminating in a small metal cap about one inch in length, and of slightly larger calibre than the rest of the instrument. Through the interior of the bougie runs a wire, the lower end of which is attached to a small cutting blade, whilst its upper extremity is connected with a spiral spring. By pressing a metallic button at the top of the bougie, the knife is thrust out through a slit on one side of the metal cap. A little notch in the edge of the button corresponding to the slit guides the operator as to the position of the cutting blade. The use of my instrument is perfectly simple. It is introduced into the gullet with the blade concealed, and when the part containing the knife is felt to be below the stricture, the blade is to be made to protrude, and by a rapid upward movement to cut through the obstructing band. The only place where this division can be safely practised is at the posterior wall of the gullet, and there only in the upper three-fourths of the tube. A week after the operation a medium-sized bougie should be passed and instruments ot gradually increasing calibre should subsequently be used from time to time.

From an examination of the results of the published cases, internal œsophagotomy does not appear to be a very satisfactory operation. Of the seventeen cases in which it has been practised, four died, *i. e.*, 23.5 per cent. This estimate includes only cases which proved fatal within fifteen days of the operation; the mortality would doubtless appear much higher if all the cases were counted in which death, though directly traceable to the operation, did not occur within the above-mentioned period. Thus, in my own case the patient died three months after the œsophageal stricture was divided, but the pulmonary inflammation, to which he ultimately succumbed, came on so soon after the operation that it is most probable there was a casual relation between the two events.

On analyzing the statistics more closely it will be found that the operation has been done eleven times for the relief of cicatricial stricture, twice for œsophageal stenosis of an indefinite nature, once for malignant, and once for tubercular disease. Of the remaining two cases I have no details beyond the fact recorded by the operator that they were successful. Of the cicatricial cases three, *i. e.* 27.28 per cent., died. This average, however, would be considerably reduced if each individual act of œsophagotomy were to be counted as a separate case, for the operation was performed six times on one of the patients, three times on another, and twice on a third. This would raise the total number of operations to nineteen, with a mortality of only 15.7 per cent. In the case of malignant disease intra-œsophageal section was practised five times, on each occasion with definite, though transient, benefit, and the patient finally died of phthisis. The patient with tubercular stricture died of peritonitis four days after the operation.

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[1] By Maisonneuve, Lannelongue, and Studsgaard.

[2] Bull. de la Soc. de Chir. de Paris, Mar. 16, 1870.

[3] Bull. de Thérapeutique, 1870, t. lxxviii. p. 252.

The *advantages* of internal œsophagotomy are:—

1st. That it is attended with an inconsiderable amount of shock.

2dly. That if the stricture can be thoroughly divided, gradual dilatation can be carried out and a cure thereby be effected.

3dly. That the procedure involves no external wound requiring constant attention and giving rise to disfigurement.

The *disadvantages* of internal œsophagotomy are:—

1st. That it can only be safely performed in cases where it is still possible to get a bougie through the stricture.

2dly. That owing to the formation of these structures, which often extend far down the gullet, it is difficult to get beyond all the points of obstruction. (It may be added that in many cases of cicatricial narrowing the obstructing ridges are vertical in direction, as in the second case detailed below, and therefore cannot be divided by any instrument.)

3dly. That in many cases the walls of the œsophagus are so much thickened that limited longitudinal incision does not relieve the obstruction.

4thly. That the actual danger attending the performance of the operation is far from inconsiderable. Indeed the thinness of the œsophageal walls, the close proximity of many vital organs, and the fact that in disease the gullet is often intimately adherent to the surrounding parts, constitute dangers which cannot be ignored. In one of the fatal cases, death was due to hemorrhage, and in one of the successful operations bleeding occurred to an alarming extent.

In the first of the two following cases of cicatricial stricture, internal œsophagotomy was performed; in the second, it was intended to do the operation, but circumstances prevented its being carried out. The important features in the case were that many of the obstructing ridges were *vertical* in direction, and could not have been divided by any œsophagotome; and further, the great extent of the disease which would have made any operation, except gastrostomy, absolutely useless.

CASE 1. Henry A. drank a solution of potash on September 17, 1880, and in spite of immediate treatment at the London Hospital, his gullet became so much narrowed that thirteen weeks elapsed before he was able to swallow fish. The stricture was treated by gradual dilatation until February, 1881, when, owing to an attack of smallpox, the patient discontinued his attendance for four weeks. When seen again he could swallow nothing but jelly. He was admitted into the Hospital for Discases of the Throat, under my care, on April 7, 1881, being by that time in an extremely weak condition. The stricture was found to begin just below the level of the cricoid cartilage, the canal of the œsophagus at the affected part being very tortuous and deviating to the left side. Gradual dilatation rendered it possible to pass a No. 8 bougie by June 2, but more than a month later an advance of only one size had been made. On July 12, I performed internal œsophagotomy, dividing the stricture in the middle line behind from below upwards. A No. 14 bougie could then be passed without difficulty. The pain of the operation was slight, but in a few hours the patient began to feel some discomfort over the base of the right lung, and unmistakable signs of pneumonia soon afterwards showed themselves. Dilatation with bougies was resumed after a few days, and in August No. 15 could be passed easily. The patient was shown to the members of the International Congress on August 4, and at that time, whilst still suffering from some pulmonary trouble, his general condition was fairly satisfactory. He passed from my care a day or two afterwards, as the Throat Hospital had to be closed for the purpose of being rebuilt. He soon afterwards re-entered the London Hospital, and died in that institution about the middle of October, 1881. At the autopsy both lungs showed patches of pneumonia, and there was some purulent effusion in the right pleura. The gullet was found thickened to such an extent as to narrow considerably the calibre of the tube for three inches downwards from the level of the cricoid cartilage. The strictured portion was found to have been divided posteriorly for about an inch at the lower part.

CASE 2. Sarah C., aged twenty-six, swallowed hydrochloric acid on February 16, 1879. She was taken to Guy's Hospital, where the immediate symptoms were treated, but the dysphagia increased so much that on April 24 gastrostomy was performed by Mr. Howse. The patient was fed entirely through the artificial opening for nearly a year, when dilatation with bougies, which had been found impracticable at an earlier period, owing to the tightness of the stricture, was again attempted. By this means the patient recovered the power of swallowing to such a degree that Mr. Howse allowed the fistulous opening to close, warning the patient at the same time that it would be necessary to pass a bougie occasionally. She left Guy's Hospital in August, 1880, in consequence of some disagreement with the nursing authorities. On September 6, in the same year, she came under my care at the Throat Hospital. A No. 2 bougie was passed, and the stricture was gradually dilated till it was large enough to admit a No. 9, and the patient's condition improved considerably. In February, 1881, however, the dysphagia had again become so severe that she had to be taken into the Throat Hospital, where for three months she was confined to bed, suffering from constant pain between the shoulders, which was increased when she tried to swallow. During all this time her temperature was always above the normal point, being often as high as 102° Fahr. in the evening. No cause, however, could be discovered for the pyrexia. After this illness the patient steadily improved for some time, in spite of occasional relapses. In the autumn of 1882 her gullet again became almost blocked up, in spite of constant attempts at dilatation, and she gradually lost strength till the early part of November, when she died.

On *post-mortem* examination the body showed little sign of wasting, there being fully an inch of fat on the abdominal walls. Both lungs were adherent to the chest walls. The œsophagus was bound to the pre-vertebral muscles by bands of dense fibrous tissue, rendering its separation from the surrounding parts very difficult. Barely half an inch below the cricoid cartilage the stricture commenced, and extended downwards to within two centimetres and a half of the cardia. The walls of the gullet throughout the whole of the strictured portion were enormously thickened, the cut edge in some places being an eighth of an inch in width, and very tough. The narrowest part of the stricture corresponded to the upper inch and a half of the gullet, and consisted of four longitudinal ridges, mainly situated on the anterior wall, but partly on the sides of the gullet. These ridges almost completely blocked up the lumen of the œsophagus, which was still further narrowed at their lower end by a transverse cicatricial band connecting them together. Lower down the stricture was made up of a meshwork of bands, most of which had a transverse direction. Throughout the strictured portion of the gullet its walls were hard and thickened. Seven centimetres above the cardia there were three openings, admitting a large probe, surrounded by some cicatricial bands. These openings communicated with a canal, which ran for two centimetres and a half downwards, and slightly to the right between the muscular fibres, and terminated in a pouch covered with muscular fibres, half an inch long, external to the gullet. Higher up, at a point rather below the middle of the œsophagus, there was a minute perforation, leading into the trachea through its posterior wall. The stomach was 6¼ inches in its smaller curvature and 12½ in its larger curvature. Its anterior surface measured 3½ inches in its widest part, and 2 inches in its narrowest part.

There was a cicatrix 2½ inches long in the abdominal wall, and on opening the stomach a depressed cicatrix, with radiating ridges, was seen about an inch and a half from the greater curvature and rather nearer the pylorus than the cardia. The stomach was united to the anterior wall of the abdomen by a dense fibrous tissue.

Dr. Roe, of Rochester, U. S., has lately reported two cases[1] in which he has successfully used my œsophagotome. One was that of a lady, aged twenty-four, on whom he twice operated for stricture of the gullet, making on the first occasion one posterior incision, and on the second two lateral cuts, after which dilatation with bougies could be satisfactorily carried out.

The patient in the other case was a boy, aged eight years, whose œsophagus was narrowed at its lower part through the action of a caustic fluid, to such a degree that even milk could scarcely be swallowed. Dr. Roe divided the stricture in six different places at intervals of a few days, and then practised dilatation with success.

On reviewing the whole subject, it appears to me that the conclusion plainly pointed to by the facts set forth in this article is that the three operations stand, as regards relative merit, in the order in which they have been described. Gastrostomy may now be said to have taken its place among the procedures of every-day surgery, and a hope may legitimately be entertained, that, as the increasing resources of science render earlier detection of œsophageal disease possible, the results of the operation will be still more satisfactory in the future. The fatality of gastrostomy has, no doubt, been in great measure due to the fact that it has often been performed only at the eleventh hour, when the patient was almost moribund; "a species of refined cruelty reflecting no credit on surgery," to use the words of an authority venerated on both sides of the Atlantic.[1] Œsophagostomy has necessarily a much narrower range of usefulness; it is always more or less a "leap in the dark," and its effects may occasionally be brilliant; it is, after all, an operation more likely to find favour with the adventurous surgeon than with the careful practitioner. In cases of syphilitic origin, however, when the stricture is at the upper part of the gullet, œsophagostomy offers a very good prospect of success, as the disease is much more frequently *limited* in its extent than either cancer or the lesions produced by corrosive fluids. As regards internal œsophagotomy, increased experience will probably show, that, though its immediate results are not so frequently fatal, its ultimate effects, when successful, are less beneficial to the patient than those of either gastrostomy or œsophagostomy.

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[1] New York Med. Record, Nov. 11, 1882, pp. 536 and 538.

ARTICLE X.

RHABDOMYOMA OF THE PAROTID GLAND.

By T. MITCHELL PRUDDEN, M.D., Director of the Physiological and Pathological Laboratory of the Alumni Association of the College of Physicians and Surgeons, New York; Lecturer on Normal Histology in Yale Medical College.

THE interest and importance which have always attended the study of the rare and complex tumours called Rhabdomyoma, or Myoma striocellulare, won greatly in significance when their characters and occurrence were adduced by Cohnheim in support of the very suggestive theory of the embryonal origin of tumours.

The fact that tumours, composed wholly or in part of such a highly organized type of tissue as striated muscle, should be formed in organs like the kidney, testicle, etc., where such tissue does not properly belong, was entirely inexplicable on any of the earlier hypotheses concerning the etiology of tumours. If, however, it be assumed that, at some time during the process of differentiation of tissues and formation of organs in the embryo, some cell or cluster of superfluous cells should form and then cease to develop, or become misplaced in such a way that its further development is rendered for the time impossible, and should remain quiescent but still endowed with all the potentialities of embryonal cells, until at

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[1] Gross, System of Surgery, 6th ed., 1882, vol. ii. p. 495.